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THE FIRST INTERNATIONAL SEMINAR ON STANDARDIZATION IN IRON AND STEEL INDUSTRY (SINORSID)

RIO DE JANEIRO

21-25 NOVEMBER 1983

Proceedings of the seminar*

* This report has been prepared by the co-organizers of the Seminar, Institute Nacional de Metrologia, Normalizacao e Qualidade Industrial (INMETRO), Rio de Janeiro, Brazil and does not necessarily reflect the views of the Secretariat of UNIDO. This document has been reproduced without formal editing.

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PART I - Introduction, Organization and Summaries of Opening and Policy Statements.

1. INTRODUCTION

1.1 The First International Seminar on Standardization in Iron and Steel Industry (SINORSID) was held at Rio de Janeiro from 21 to 25 November, 1983.

1.2 UNIDO's most comprehensive and ambitious project on standardization, quality control and quality certification in the field of iron and steel, has resulted in substantial economic benefits to the Brazilian industry and it was felt that an international seminar on the subject of standardization in iron and steel industry with the backing of Brazilian experience would provide a basis for generating and spreading standards and quality consciousness in the developing countries. It was therefore decided to organize an international seminar and invite participants from developing countries to take part in a five-day seminar in Brazil to get acquainted with Brazilian achievements in standardization, quality control and quality certification in the area of iron and steel. The seminar was planned to have comprehensive lectures on the subject by the President of INMETRO/UNIDO Project Manager and by Brazilian experts. In addition, four international consultants were invited to participate in the seminar. These experts covered the following areas:

- standardization
- training
- documentation
- quality assurance.

The seminar was also planned to discuss ways and means for implementing a programme of action for developing countries in steel standardization.

1.3 Detailed local arrangements for the seminar were made by IBS (Instituto Brasileiro de Siderurgia), acting on behalf of INMETRO, the executive agency of SINMETRO, the national system of standardization, metrology and industrial quality.

1.4 After the opening of the seminar, its proceedings developed broadly into two phases:

a) presentation of papers on selected themes (see 1.2) their discussions and conclusions;

b) short presentations on existing position regarding standardization in iron and steel sector in other developing countries whose representatives were specially invited under UNIDO sponsorship, discussion of the difficulties of the developing countries and conclusions and recommendations regarding type of assistance needed by them.

1.5 This report is accordingly organized into the following parts:

Part I - Introduction, Organization and Summaries of Opening and Policy Statements.

Part II - Papers on selected themes, discussion and conclusions.

Part III - Existing position in certain countries, difficulties faced by developing countries and type of assistance required.

2. ORGANIZATION AND PROCEDURE OF THE SEMINAR

2.1 The seminar was organized in seven half-day sessions. Dr. Walter dos Santos, President INMETRO was the chairman of the conference. A complete list of those who participated in the seminar is given in Annex I.

2.2 During the different sessions, the themes were organized to form a comprehensive group and papers on these themes were presented with appropriate visual aids.

3. OPENING OF CONFERENCE

3.1 Dr. Walter dos Santos welcomed the participants and outlined the importance of this International Seminar in the context of exchanging experience and technical co-operation among developing countries. Dr. Lourival Carmo Mônaco, Secretary, Secretariat of Science and Technology of the Ministry of Industry, Government of Brazil delivered the inaugural address on behalf of the Minister for Industry and touched upon the importance being attached to the consolidation and reinforcement of the national standardization system of the country in the III Basic Plan of Scientific and Technological Development (1980 - 1985) by the Government of Brazil and hoped that the seminar would promote co-operation and contacts among countries and facilitate exchange of information on Brazilian experience in this field.

3.2 On behalf of UNIDO, Mr. B. S. Krishnamachar, Chief Technical Adviser of the project, mentioned iron and steel being essential basic raw materials for the extensive all round development envisaged in the Brazilian National Plan for Development, high priority was given for expansion of steel production as well as for initiating a comprehensive programme of standardization, quality control and quality certification. The UNIDO project in this field executed with success through the active participation of the government, steel industry, consumers, INMETRO and ABNT would be a major theme of discussion for exchanging information among the participating countries.

PART II - Papers on Selected Themes, Discussion and Conclusions

4. STATUS OF STANDARDIZATION IN BRAZIL
(I Day - November 21 - Afternoon)

4.1 This session was presided over by Dr. Moacir Reis. (CNPq, Brazil). The following two papers were presented:

a) National System of Standardization, Metrology and Industrial Quality by Dr. Walter dos Santos.

b) System of the National forum for standardization, Association for Brazilian Technical Standards by Dr. Accacio F. Santos, Executive Secretary - ABNT.

4.2 Dr. Walter dos Santos elaborated on the work of the national system of standardization in Brazil with its accomplishments in respect of standards formulation, legal, scientific and industrial metrology, accreditation of laboratories, conformity marking, and measurement assurance system.

4.3 Dr. Accacio F. Santos, mentioned that there were 23 National Committees covering various sectors of industry and outlined the elaborate system for standards preparation within ABNT. He also dealt with the various aspects of participation by ABNT in regional and international standards work. He said that the problems of industrial quality were the same in all developing countries and felt that a higher order of co-operation and support for national standards bodies from industry would go a longway to avoid multiplicity of standards in these countries.

5. STANDARDIZATION AND INDUSTRIAL QUALITY
(II Day - November 22 - Morning)

5.1 This session was presided over Dr. Joseph Brais, Director of Standardization, INMETRO and the following three papers were presented:

a) UNIDO Project BRA/75/003 - Mr. B. S. Krishnamachar - Chief Technical Adviser-UNIDO.

b) National Standardization in Iron and Steel CB-1 Col. Cyro Borges, President of CB-1.

c) Standardization and Industrial Quality - Mr. Jan Ollner, Vice-President ISO.

5.2 The presentation by Mr. B. S. Krishnamachar on the UNIDO Project BRA/75/003 dealt with the comprehensive nature of the project and the achievements were explained with suitable visual presentations. Training of personnel had been one of the important tasks as well as developing standards consciousness in the industry. Sixty engineers and scientists were trained to tackle national standards activity; about 60 professors of technical universities to teach standardization and over 800 engineers, scientists and technicians for tackling standardization activities at the company level; 42 persons from government and industry had taken advantage of UNIDO fellowship

training programme around the world. Another successful activity introduced in Brazil related to the establishment of company standards at the corporate level and in many steel plants and steel consuming industries. This included training of personnel, organization of meetings and procedures and development, implementation and auditing of company standards.

5.3 Col. Cyro Borges explained in detail the role of Comite Brasileiro-1 (CB-1), the Brazilian Committee for standardization in Mining and Metallurgy, in the successful completion of the UNIDO Project on steel standardization for Brazil and how within the last four years more than 200 standards in the iron and steel sector were developed to cover several aspects of standardization.

5.4 In his paper on "Importance of Standardization for a developing economy" Mr. Jan Ollner explained that a well established system of company, national and international standards - supported by effective quality assurance and metrology procedures - for materials, components and basic products made specialization and sub-contracting possible for the industry. This resulted in higher efficiency and better products and increasing export for developing countries and hence they should attach special importance for standardization.

5.5 During the discussions, it was brought out that in developing countries, in order to accelerate standardization activities, it would be necessary to:

a) develop standards consciousness at all levels; and

b) develop standardization as a profession.

5.6 To a question, Mr. Jan Ollner replied that the pace of standardization could not be judged on the economic results all of a sudden, but one should have patience and a sense of idealisim and conviction that standardization would ultimately bring enormous benefits, as it has done so in all developed countries.

6. INDUSTRIAL QUALITY AND TRAINING
(II Day - November 22 - Afternoon)

6.1 This session was presided over by Dr. Juarez Tavora Veado, General Director (FTI) - the following papers were presented:

1) Industrial Quality - Mr. B. S. Krishnamachar, Chief Technical Adviser, UNIDO.

2) Training needs in the areas of standardization, industrial quality and metrology - Mr. T. Rajaraman - UNIDO.

3) Standardization as a subject at engineering and technical institutions in Brazil - Mr. Ricardo Barcelos da Nóbrega - INMETRO.

4) Internal Training and implementation of standards - Engineers from COSIPA.

6.2 In his paper on "Industrial Quality in Developing Countries" Mr. Krishnamachar stated that the changing scenerio of industrial sector in developing countries, necessitated adoption of more modern and efficient methods of production control, quality and cost, as they have to compete successfully in international markets. Normally the standards bodies, are recognized as national centres for stimulating progress in achievement of quality, in addition to their conventional role of setting standards and conducting tests. He discussed the role of industrial quality in developing countries and how this was supported by

other institutions which were emerging in these countries.

6.3 In his paper on "Training needs in areas of standardization, metrology and industrial quality", Mr. T. Rajaraman, UNIDO Expert, mentioned that rapid industrialization in developing economies had brought into focus the advantages of standardization, metrology and industrial quality and the need for trained personnel in this field. Consequently a demand had arisen for training of personnel and hence the development of training programmes at national and international levels to provide participants, within a relatively short-time, with theoretical knowledge as well as practical experience in a concentrated form. He explained the needs of such programmes and outlined the contents of different types of training programmes in the areas of standardization, quality control and metrology. He also dealt on the basic concepts and essentials for formulating a training programme.

6.4 In his paper on "Standardization as a subject at engineering and technical institutions in Brazil", Mr. Ricardo Barcelos da Nôbrega of INMETRO, described the current Brazilian situtation regarding the study of standardization inside Brazilian schools. He described the main activities being planned and accomplished towards implementation of standardization as a subject for professional development and how the Government of Brazil had supported this measure through suitable directives.

6.5 The presentation by COSIPA explained the internal training programmes for the engineers and technicians of COSIPA and implementation of Company Standards in the plant.

6.6 During the discussions, Mr. Krishnamachar explained that the phase of development in Brazil could be classified in Phase IV as described in his paper and that quality circles as practised in Japan needed modifications to suit the specific culture of a country.

6.7 In reply to a question on the availability of suitably tailored training programmes of the various types based on the modern concepts of training, as explained in the UNIDO paper on "Training needs in the areas of standardization quality control and industrual quality", Mr. T. Rajaraman stated that in as much as widespread consciousness for standardization and industrial quality was yet to be developed in several developing countries, such training programmes based on modern concepts of training were yet to be developed and propagated in this field although such programmes were available in other fields of activities like management, safety, etc.

7. COMPANY STANDARDIZATION
(III Day - November 23 - Morning)

7.1 This session was presided over by Dr. Caio Mário de Sá and the following papers on company standardization case studies from Brazil were prescribed:

1) Variety reduction of bought-out materials - Equipamentos Villares S. A.
2) Utilization of standards information - COSIPA.
3) Standardization of equipment for iron and steel industries - USIMINAS.

7.2 The three studies of typical examples in variety reduction, computerization of standards information and inplant standardization for multifarious equipment used in iron and steel industry from Brazil, presented with suitable visual aids by engineers from large companies like VILLARES, COSIPA and USIMINAS, provided

an in-depth analysis of the situation in Brazil to the participants. There was an unanimous opinion among the participants that by combining standards of equipment manufacturers with the unified needs of steel industry, there was an accelerated technological absorption process thus leading to adaptation of technologies from different sources, thus minimizing stocks of replacement goods with considerable cost-savings. Participants were greatly impressed with the results achieved in these companies.

8. COMPANY STANDARDIZATION
(III Day - November 23 - Afternoon)

8.1 This session was presided over by Col. Cyro Alves Borges and the following papers on standardization at the company level were presented:

1) Standardization of operational procedures at CSN.

2) Implementation of standards in an iron and steel plant - AÇOMINAS.

3) Technical standards used in the agreement for services of construction and assembly - PETROBRAS (Brazilian Holding Company for Petroleum).

4) Standardization at a ship building company - SINAVEL.

5) Standardization of operational procedures - CSN.

6) Presentation on UNIDO collaboration in iron and steel industry - Prof. German Surguchov, UNIDO.

8.2 The case studies of typical examples in organizing a methodical company standardization work in diversified steel producing and consuming industries like petroleum, ship building, etc. presented with suitable visual aids by engineers from PETROBRAS, SINAVEL, CSN, AÇOMINAS

provided an in-depth analysis of the problems faced at the initial stage and achievements in organizing standardization at company level interalia its impact on national and international work in the field of standardization for iron and steel industry.

8.3 The seminar was presented with an elaborate expose by Prof. German Surguchov of UNIDO on the technical assistance to developing countries in the field of iron and steel industry. In concluding, Prof. German Surguchov said that the UNIDO Project BRA/75/003 was one of the most successful [illegible] as far implementation and achievements were concerned in the area of UNIDO's technical assistance to developing countries in the field of iron and steel industry. He further said that UNIDO would only be too glad to assist other developing countries in extending the experience gained in this project.

9. INFORMATICS AND STANDARDIZATION
(IV Day - November 24 - Morning)

9.1 The session was presided over by Prof. German Surguchov of UNIDO. Two papers were presented by specially invited consultants of UNIDO and two papers by Brazilian participants as follows:

1) Information as a factor in metrology, standardization and quality control (UNIDO) - Mr. E. John French, ISO - Geneva.

2) Information system of SINMETRO - Dr. Francisco Sá - INMETRO.

3) GATT Standards code and the operation of the Canadian Enquiry Point (UNIDO) - Miss Mary Crainey - Manager, Standards Information Centre of Canadian Standards Council.

4) Agreement on Technical Barriers to Trade of GATT - Mr. Adriano Braga de Melo, INMETRO.

9.2 The papers highlighted information as an important resource for spreading standardization philosophy at national and international levels and the need for organizing information centres affiliated to ISONET and GATT to serve the obligations under the "Standards Code" signed by several contracting parties to GATT.

10. ECONOMIC BENEFITS OF STANDARDIZATION
(IV Day - November 24 - Afternoon)

10.1 The session presided over by Mr. Iwan Oleg Von Hertwig had three speakers who presented following themes on economic benefits of standardization and case studies:

1) Economic Benefits of Standardization - Dr. B.S. Krishnamachar - Chief Technical Adviser, UNIDO.

2) Cost/Benefit of Standardization - Case study of COSIPA - Mr. Álvaro Mendes da Silva.

3) Standardization of Materials and economic effects - Case study of CSN - Mr. Mário Marques Arruda.

10.2 After the presentation, the participants in their discussion, agreed that studying of economic benefits was necessary in order to make top management understand and appreciate the importance of standardization as well as alloting priority. In this connection, the participants drew attention to the contribution of the UNIDO Project in inviting a specialist on the study of economic benefits and training engineers in several industries in Brazil in the methodology for evaluation of economic benefits at company level.

PART III - Existing position in certain countries, difficulties faced by developing countries and types of assistance required.

11. PRESENTATION ON EXISTING POSITION REGARDING STANDARDIZATION IN CERTAIN COUNTRIES

Association of South East Asian Nations (ASEAN) - Mr. Ignácio Gatmaitan Salcedo (Phillipines).

11.1 Speaking on behalf of ASEAN countries represented in this seminar, Mr. Ignácio Gatmaitan Salcedo stated that realizing the importance of regional standardization ASEAN countries had initiated a regional standardization programme in the area of iron and steel; he said that their countries being small in size could achieve economy of scale of production, only if their market and demands were unified. He emphasized the importance of spreading standards counsciousness within the public through creative works of art for publicity media.

11.2 Mr. Yildirim Ozturk (Turkey)

On behalf of Turkey, Mr. Ozturk gave an outline of Turkish iron and steel industry and the extent of standardization work done in that field. He felt that they could obtain considerable benefits from the Brazilian experience.

11.3 Mr. Olivia Hernandez (Argentina)

On behalf of Argentina, Mr.. Olivia Hernandez briefed the seminar on the status of steel industry and standardization and mutual colaboration existing between Brazil and Argentina. He further advocated adoption of ISO standards for regional and national standardization work.

11.4 Mr. Luis Raul Estrada Gutierrez (Mexico)

In a detailed paper circulated by the Mexican participant, Mr. Luis Raul Estrada Gutierrez observed that in the area of standardization for iron and steel, evaluation and typification of Mexican steel for automotive industry was a significant step. Furthermore, in the development of alloys, Mexican Institute of Steel had done significant work in the matter of reference materials (SRM), dental alloys, degasified melts, high quality materials, etc. In the matter of import substitution, he said that Mexico had developed cover powders for continuous casting of steel and achieved hundred percent indiginisation for this critical material for steel industry.

11.5 Mr. Mohamed Dia El Din Tantawi (Egypt)

Mr. Tantawi gave a brief outline of the Egyption steel industry and observed it was worthwhile for other developing countries to follow the Brazilian experience through this UNIDO Project. He further felt that UNIDO should utilize its resources for transferring the know-how gained through the implementation of this project to other developing countries.

11.6 Mr. B. Olowodola (Nigeria)

The Nigerian participant said that in developing countries, establishment of national standards was a difficult task owing to the presence of multinationals in their countries, who brought with them different standards. Sometimes, such multinationals were not very enthusiastic in evolving national standards. He felt that multinationals should encourage setting up of national standards and in fact they should use their resources to help in the standardization work of the national standards bodies.

12. FINAL PLENERY SESSION

12.1 After the overseas participants presented their views and opinions and after hearing the observations of Brazilian participants, a small working group consisting of Mr. Ricardo Barcelos da Nóbrega, Dr. B. S. Krishnamachar and Mr. Iwan Oleg Von Hertwig drafted the recommendations and presented them to the plenary session of the seminar presided over by Dr. Walter dos Santos, President of INMETRO. The seminar finally adopted the following recommendations unanimously.

1) In developing countries, financial institutions and other government bodies should generously support development of standardization at national and company level, as standardization activity is normally handicapped due to financial constraints.

2) In developing countries, it is important to establish professional institutes for promotion of standardization and extensive application of standards in all sectors of national economy.

3) Developing countries should actively participate in the work of the Technical Committee ISO/TC17-Steel of International Organization for Standardization in order to get their needs incorporated in these standards.

4) Developing countries should pay special attention to extensively publicize the need and activities of standardization in the form of handouts, cartoons, films, music, etc. through several publicity media for arousing standards counsciousness in the country.

5) Developing countries should take steps for promoting standardization as a subject for study in universities and technical institutions.

6) Developing countries should establish a proper national informatics system for standardization to assist the industry and consumers.

7) UNIDO should promote a similar seminar in the year 1984 in order to promote exchange of information and experience among the developing countries.

8) The results achieved and experience gained by Brazil through the implementation of this UNIDO/INMETRO Project should be shared with other developing countries through steps taken by UNIDO.

9) National organs for standardization should promote periodical national seminars on standardization for sharing the experience of various organizations within the country and finding solutions to common problems.

10) Steps should be taken by UNIDO to institute a Latin American regional steel standardization programme similar to the ASEAN programme.

12.2 On behalf of UNIDO, Mr. German Surguchov thanked the Government of Brazil, INMETRO and their participating organizations and the foreign participants for their overwhelming response to the seminar and successful deliberations and hoped that the recommendations would be taken note of by the appropriate authorities/ agencies.

12.3 Dr. B. S. Krishnamachar in winding up the discussions said that the participants brought out the various activities executed through UNIDO/INMETRO project and concrete results achieved and they had also presented in quantitative terms with examples of economic benefits of standardization. It is essential that other developing countries should greatly profit from the Brazilian experience. He thanked the Brazilian participants and overseas delegates for effective contribution to the seminar.

12.4 The chairman of the seminar Dr. Walter dos Santos expressed his utmost satisfaction that the seminar was conducted well. He assured foreign participants that Brasil would gladly share its experience with other countries.

12.5 Dr. Walter dos Santos thanked all the participants and wished the overseas participants a happy return journey and declared the seminar as closed.

ANNEX I

LIST OF PARTICIPANTS

1. CHAIRMAN

Dr. Walter dos Santos, President - INMETRO

2. CO-CHAIRMAN

Dr. B. S. Krishnamachar, Chief Technical Adviser - UNIDO.

3. ARGENTINA

Mr. Olivia Hernandez

4. BRAZIL

Accácio F. Santos Júnior
Adilson Ramos Augusto
Adriano Braga de Melo
Ailton Geraldo Paschon
Almyr Borges da Silva
Álvaro Mendes da Silva
Angélica Maria Rezende Guedes Maciel
Antonio Avertano Barreto da Rocha
Antonio Laitamo
Antonio Marcos Rennó de Azevedo
Antonio Umberto Garcia
Armando da Silva Tavares
Armando Meton de Alencar Fialho
Attilio Travalloni
Benjamin Mário Baptista
Bijoy Patnaik
Caio Mário de Sá
Carlos Alberto Marques Couto
Carlos Antonio Nogueira Filho
Cecília Elisabeth Fuchs

Célia Giusti de Seta
Cigiê Bins Pinto
Cláudia Campello Alves
Cláudio Loewenstein
Cláudio Lombardi
Cláudio Luiz Frões Raeder
Cyro Alves Borges
Danilo de Carvalho
Darcy Gil Neto
Décio Mauro Rodrigues da Cunha
Douglas Cisneiros
Edel Pereira da Silva
Edenir Correa Leite
Edgard Gabriel Seidner
Egletis Malagoni Melgaço
Elias de Oliveira Ribeiro
Eloywaldo Brito de Paula
Emílio Antonio Cordeiro Caviedes
Érico de Oliveira Neves
Fernando Antonio de Souza Mariano
Francisco Sá
Gerson Araújo Mattos
Gilberto José de Oliveira Moreira
Heitor Augusto de Souza Lima
Heliane Fonseca
Ilídio Bonfin Teixeira
Isabel Moniz de Aragão de Lemos Loureiro
Ismael de Carvalho Prestes
Ivan da Fonseca e Silva
Iwan Oleg Von Hertwig
Jadir Portes Bartolomeu
Jamil Gedeão
Jorge Tibor Kaffer
José Adalberto dos Santos
José Albertino de Souza
José Edison Soares
José Eduardo Alves Costa
José Francisco Toledo Melara

José Guilherme Araújo Lameira Bittencourt
José Luiz Brandão
José Ribamar B. Chehebe
José Waltencyr de Aquino
Joseph Brais
K. Chawla
Laerte Rangel Palha
Laura Maria Rodrigues Calddas
Lewton Buriti Veri
Lia Bayão Feder
Liberato Bittencourt Bisneto
Lourival Mônaco
Luis A. Fernandez Molero
Luiz Alberto Pimentel Camballo
Luiz Alberto Rosas Costa
Luiz Antonio do Souto Gonçalves
Luiz Antonio G. Cardoso
Luiz César dos Santos Lagoa
Luiz Fernando Reis de Araújo
Luiz Otávio Ferreira Duarte
Luiz Paulo Ramos Segalla
Luiz Sérgio Ponce
Márcio Moreira
Marco Aurélio Ferreira de Souza
Marcos Antonio Mesquita
Marcos Augusto Barbosa de Góes
Marcus Vinicius Lamas Schlaucher
Maria Helena de Souza Alvarez
Maria Virgínia Ruas Santos
Mariano Mattei
Mário Souto Lyra
Marques Arruda
Maurette Brandt
Moacir Reis
N. D. Dhere
Newton de Souza Ortman
Neyl A. Mattos
Nivaldo Carvalho Lage

Olívio Manoel de Souza Ávila
Paulo Aquino Cardoso de Mello
Paulo César Gonçalves Egler
Paulo César Overa Tavares
Paulo Dias Martins Filho
Paulo Kulcsar
Paulo Roberto Furtado Mazeron
Paulo Sérgio T. da Costa
Regina Alves Vimercati
Ricardo Barcelos da Nóbrega
Roberto Barros Pacheco
Roberto C. Vidigal
Roberto Coelho Pires
Rudolf Robert Buhler
Ruy Cortez de Oliveira
Samuel Lemes Silva
Sebastião Faria de Souza
Sérgio do Amaral Vieira
Sérgio dos Santos Cardoso
Sérgio Quintela
Silvio Coutinho
Silvio Oderp Girão
Silvio Vieira Chaves
Solange Loureiro Teixeira
Stephen Lee Peters
Thércio de Almeida
Vitor Márcio Rodrigues Jardim
Walter dos Santos
Wilson Borges
Wilson Lourenço

5. CHINA
Mr. Yan Chu

6. COLOMBIA
Mr. Hernando Murcia Aguilera

7. EGYPT
Mr. Mohamed Dia El Din Tantawi

8. INDONESIA
Mr. Maman Abdul Rochman

9. MALAYSIA
Mr. S. Arumugam Kandaya

10. MEXICO
Mr. Luis Raul Estrada Gutierrez

11. NIGERIA
Mr. B. Olowodola
Mr. Danlami Garba

12. PERU
Mr. Carlos Larriviere Vera

13. PHILLIPPINES
Mr. Ignácio Gatmaitan Salcedo

14. THAILAND
Mr. Chalit Homhual

15. TURKEY
Mr. Yildirim Ozturk

16. VENEZUELA
Mr. Luis A. Fernandez Molero

17. UNIDO
Mr. E. John French
Mr. Jan Ollner
Mr. Luis Soto-Krebs
Miss Mary Crainey
Mr. T. Rajaraman
Mr. G.D. Surguchov

ANNEX II - ACRONYMS

ABNT	Associação Brasileira de Normas Técnicas
AÇOMINAS	Aços Minas Gerais S. A.
CNPq	Conselho Nacional de Desenvolvimento Científico e Tecnológico
CONSIDER	Companhia Siderúrgica
COSIPA	Companhia Siderúrgica Paulista
CSN	Companhia Siderúrgica Nacional
FTI	Fundação Tecnologia Industrial
IBS	Instituto Brasileiro de Siderurgia
INMETRO	Instituto Nacional de Metrologia, Normalização e Qualidade Industrial
ISO	Organisation Internationale de Normalisation
PETROBRAS	Petróleo Brasileiro S. A.
SINMETRO	Sistema Nacional para Metrologia, Normalização e Qualidade Industrial
SINORSID	Seminário Internacional de Siderurgia
SINAVAL	Sindicato Nacional da Indústria da Construção Civil
UNIDO	Organização das Nações Unidas Para o Desenvolvimento Industrial
USIMINAS	Usinas Siderúrgicas de Minas Gerais S. A.
VILLARES	Indústrias Villares